

IN THE CLAIMS:

1. **(Currently amended)** A thermoelectric conversion material having a ~~crystal~~ polycrystal structure in which [[a]] at least one added element ~~or a combination of added elements~~ is ~~or are~~ contained in an amount of 0.001 to [[30]] ~~5~~ at % in silicon, and at least one ~~type of~~ said added element is ~~deposited on~~ deposited at boundaries between crystal grains ~~in which formed of virtually all silicon accounts for at least 80 at%~~ of the polycrystal structure, and at the grain boundary thereof.

2. **(Currently amended)** A thermoelectric conversion material having a ~~crystal~~ polycrystal structure in which [[a]] at least one dopant ~~or a combination of dopants that generate~~ generates carriers is [[or are]] contained in an amount of 0.001 to 20 ~~5~~ at% in silicon, and at least one ~~type of added element~~ said dopant is ~~deposited on~~ deposited at boundaries between crystal grains ~~in which formed of virtually all silicon accounts for at least 80 at % of the polycrystal structure, and at the grain boundary thereof.~~

3. **(Currently amended)** A thermoelectric conversion material having a [[crystal]] polycrystal structure in which [[a]] at least one dopant ~~or a combination of dopants that generate~~ generates carriers is [[or are]] contained in an amount of 0.0001 to 20 ~~5~~ at % and [[a]] at least one added element ~~or a combination of added elements that~~ [[do]] does not generate carriers is ~~or are~~ contained in an amount of 0.1 to 10 at% silicon, and at least one [[type]] of said added element elements is ~~deposited on~~ deposited at boundaries between crystal grains in which

~~virtually all silicon accounts for at least 80 at% of the polycrystal structure, and at the grain boundary thereof.~~

4. **(Currently amended)** A thermoelectric conversion material having a ~~crystal polycrystal~~ structure in which ~~[[a]] at least one~~ added element or a combination of added elements that ~~[[do]] does not~~ generate carriers is carriers is ~~[[or are]]~~ contained in an amount of 0.1 to ~~20 5~~ at% and ~~[[a]] at least one~~ dopant or a combination of dopants that ~~do generate generates~~ carriers is ~~[[or are]]~~ contained in an amounts of 0.001 to ~~10 5~~ at% in silicon, and at least one ~~[[type of]]~~ said added element is deposited on crystal grains ~~formed of virtually all silicon accounts for at least 80 at% of the polycrystal structure, and at the grain boundary thereof.~~

5. **(Cancel).**

6. **(Cancel).**

7. **(Currently amended)** The thermoelectric conversion material according to any one of claims 1 to ~~[[6]]~~ 4, wherein, of the added elements, the one that generates carriers and is used to make a p-type semiconductor (dopant Ap) is one or more types selected from the group consisting of an Ap1 group (Be, Mg, Ca, Sr, Ba, Zn, Cd, Hg, B, Al, Ga, In, Ti) and transition metal elements M₁ (Y, Mo, Zr).

8. **(Currently amended)** The thermoelectric conversion material according to any one of claims 1 to ~~[[6]]~~ 4, wherein, of the added elements, the one that generates carriers and is used to make an n-type semiconductor (dopant An) is one or more types selected from the group

consisting of An1 group (N, P, As, Sb, Bi, O, S, Se, Te), transition metal elements M₂ (Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Nb, Ru, Rh, Pd, Ag, Hf, Ta, W, Re, Os, Ir, Pt, Au; where Fe accounts for [[10]] 5 at% or less), and rare earth elements Re (La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Yb, Lu).

9. **(Currently amended)** The thermoelectric conversion material according to any one of claims 1,3, ~~4, 5, and 6 and 4~~, wherein, of the added elements, the one that does not generate carriers is one more types selected from the group consisting of Group IV elements other than silicon, Group II-V compounds semiconductors, and Group II-Vi compound semiconductors.

10. **(Currently amended)** The thermoelectric conversion material according to any one of claims 1 to [[6]] 4, wherein the material is an ingot quenched from a melt, sinter, a heat treated laminate, or a material having a porosity of 5 to 40%.

11. **(Original)** The thermoelectric conversion material according to claim 10, wherein the material consists of a p-type or n-type semiconductor material whose carrier concentration is 10¹⁷ to 10²¹ (M/m³) and whose thermal conductivity is no more than 50 W/m • K.

12. **(Original)** The thermoelectric conversion material according to claim 10, wherein the added element that does not generate carriers is germanium, and the carrier concentration in the semiconductor is 10¹⁹ to 10²¹ (M/m³).

13. **(Currently amended)** A method for manufacturing the thermoelectric conversion material according to any one of claims 1 to [[6]] 4, including a step of cooling a melt such that added elements are contained in silicon, and with which a crystal structure is obtained in which at least one type of added element is deposited ~~on~~ at boundaries between crystal grains ~~in which silicon accounts for at least 80 at % of the polycrystal structure, and at the grain boundary thereof formed of~~ virtually all silicon.

14. **(Original)** The method for manufacturing a thermoelectric conversion material according to claim 13, wherein the melting is arc melting or high-frequency melting.

15. **(Original)** The method for manufacturing a thermoelectric conversion material according to claim 13, wherein the melting and cooling are accomplished by CZ method, FZ method, or ZL method.

16. **(Currently amended)** A method for manufacturing thermoelectric conversion material according to any one of claims 1 to [[6]] 4, including a step of powderizing a material containing [[a]] an added element in silicon, and a step of sintering the powder, and with which a crystal structure is obtained in which at least one type of added element is deposited on crystal grains ~~in which formed of~~ virtually all silicon ~~accounts for at least 80 at % of the polycrystal structure, and at the grain boundary thereof.~~

17. **(Currently amended)** A method for manufacturing the thermoelectric conversion material according to claims 1 to [[6]] 4,

including a step of cooling a melt such that added elements are contained in silicon, a step of powderizing the material thus obtained, and a step of sintering the powder, and with which a crystal structure is obtained in which at least one type of added element is deposited on crystal grains in ~~which formed of virtually all silicon accounts for at least 80 at% of the polycrystal structure, and at the grain boundary thereof.~~

18. **(Original)** A method for manufacturing a thermoelectric conversion material according to claim 17, wherein a powder with an average crystal grain diameter of 1 to 50 μm and an average particle diameter of 3 to 100 μm is sintered.

19. **(Currently amended)** A method for manufacturing the thermoelectric conversion material according to any one of claims 1 to [[6]] 4, including a step of coating a silicon powder with [[a]] an added element or embedding the latter in the former, and a step of sintering the silicon powder, and with which a crystal structure is obtained in which at least one type of added element is deposited on deposited at boundaries between crystal grains in ~~which formed of virtually all silicon accounts for at least 80 at% of the polycrystal structure, and at the grain boundary thereof.~~

20. **(Original)** A method for manufacturing a thermoelectric conversion material according to claim 19, wherein the added element is contained in the silicon powder itself.

21. **(Original)** A method for manufacturing a thermoelectric conversion material according to claim 19, wherein the coating step is a vapor phase growth process or a discharge plasma treatment.

22. **(Original)** A method for manufacturing a thermoelectric conversion material according to claim 19, wherein the embedding step is mechanofusion treatment.

23. **(Currently amended)** A method for manufacturing the thermoelectric conversion material according to any one of claims 1 to [[6]] 4, including a step of forming and laminating layers of silicon or including silicon and layers including added elements, either alternately or in the required pattern, and a step of subjecting the laminated area to a heat treatment, and with which a crystal structure is obtained in which at least one type of added element is ~~deposited on~~ deposited at boundaries between crystal grains ~~in which~~ formed of virtually all silicon ~~accounts for~~ at least 80 at% of the polycrystal structure, and at the grain boundary thereof.

24. **(Currently amended)** A method for manufacturing the thermoelectric conversion material according to any one of claims 1 to [[6]] 4, including a step of cooling a melt such that added elements are contained in silicon, a step powderizing the material thus obtained, and a step of subjecting a powder to hot pressing or discharge plasma sintering to adjust the porosity to between 5 and 40%, and with which a crystal structure is obtained in which at least one type of added element is ~~deposited on~~ deposited at boundaries between crystal grains ~~in which~~

Appln. No.: 09/674,978
Docket No.: 66409-202-7
Amdt. Dated Apr. 23, 04
Reply to Office action of Oct. 23, 03

formed of virtually all silicon accounts for at least 80 at% of the
~~polycrystal structure, and at the grain boundary thereof.~~